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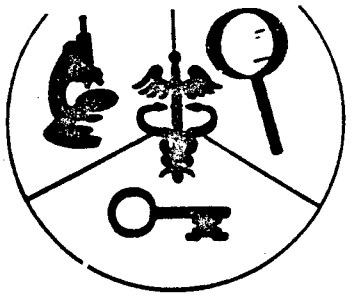

DIRECTORATE OF
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DENTAL FITNESS CLASS 3 TREATMENT NEEDS: A REPORT OF CONSULTATION

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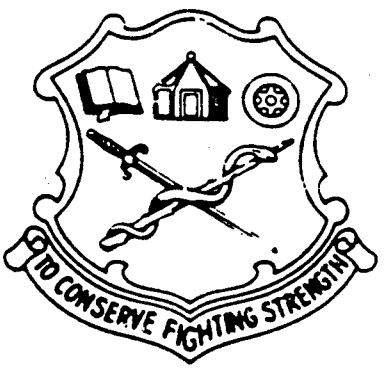

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The purpose of this consultation was to estimate the hours of treatment time necessary to bring a soldier from Dental Fitness Class 3 to Dental Fitness Class 2. A systematic sample of 660 dental records from the Fort Hood Dental Activity were reviewed by six general dentists. A sub-group of 30 records was used to evaluate inter-examiner and intra-examiner reliability among the six examiners. The amount of estimated dentist treatment time (including consultations) required to bring the sample from Class 3 to Class 2 was 2.75 hours per soldier. Of this, 2.2 hours (80%) was for non-periodontal treatment. Soldiers in combat units had the highest estimated treatment time (2.95 hours) and represented the highest proportion of Class 3 soldiers in the study population (56.3%). Substantial inter-examiner and intra-examiner variability in estimating total treatment time was observed, however, the majority of the variation in total treatment time estimates was due to differences between patient treatment needs. This study will enable Dental Activity commanders to estimate the amount of treatment time required to prepare a large military unit for mobilization.

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EXECUTIVE SUMMARY

Background

At the request of the Chief of the Army Dental Corps, the Dental Studies Division of the Health Care Studies and Clinical Investigation Division planned and conducted a study to estimate the treatment time necessary to bring active duty soldiers in Dental Fitness Class 3 to Dental Fitness Class 2.

Methods

A systematic sample of 660 dental records of soldiers in Class 3 was selected from four clinics at Fort Hood, Texas. The records were reviewed by six general dentists and their estimates of treatment time were recorded. A sub-group of 30 records was used to evaluate inter-examiner and intra-examiner reliability among the six examiners.

Results

The amount of estimated dentist treatment time (including consultations) required to bring the sample from Class 3 to Class 2, was 2.75 hours per soldier. Of this, 2.2 hours (80%) was for non-periodontal treatment. Soldiers in combat units had the highest mean treatment time (2.95 hours) and represented the highest proportion of Class 3 soldiers in the study sample (58.3%). Soldiers under the age of 24 had the highest mean non-periodontal treatment times (2.51 hours). Also, of the 660 Class 3 soldier

records reviewed, 419 (63.5%) would be placed in Dental Fitness Class 1 after only one treatment session for their Class 3 dental problem.

There was substantial inter-examiner variability in estimating total treatment time, and there was no pattern to this variability based on the amount of treatment time estimated. This is not surprising since complex cases often have alternative treatment plans that can be associated with different levels of effort. This finding is in contrast to those reported in an earlier study involving the treatment needs of soldiers in Dental Fitness Class 2 in which inter-examiner variability increased with treatment needs.

Substantial intra-examiner variability in estimating total treatment time was also observed, although there was overall consistency for the individual examiners. Despite the intra-examiner and inter-examiner variability, the majority of the variation in total treatment time estimates was due to differences between patients rather than between observers.

Conclusion

This study will enable Dental Activity commanders to estimate the amount of treatment time required to prepare a large military unit for mobilization.

ACKNOWLEDGMENTS

The authors wish to recognize the generous assistance and support of Colonel Julian Dismukes, commander of the Ft. Hood Dental Activity, and his staff. The project officer was LTC Frank Allen. The dental officers who reviewed the records were Dr. Carroll Block, MAJ Steve Dilley, CPT Shinsim Kim, CPT Gino Orlandi, Dr. Arnold Redmond, and CPT Robert Ruff. A special thanks to SSG Terry Williams and his assistants who selected the records and handled the administration of this study.

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Background

At the request of the Directorate of Dental Services, U.S. Army Health Services Command, the Dental Studies Division of the Army Health Care Studies and Clinical Investigation Activity (HCSCIA) designed and conducted a study in 1991 to estimate the treatment time necessary to bring active duty soldiers in Dental Fitness Class 2 to Dental Fitness Class 1 (1). After reviewing this study, the Chief of the Army Dental Corps, tasked the Dental Studies Division to conduct a similar study to estimate the treatment time necessary to bring active duty soldiers in Dental Fitness Class 3 to Dental Fitness Class 2.[1]

Previous studies have assessed the dental treatment needs of active duty military populations (2-11). Most of these studies were conducted between 1956 and 1981, and report restorative dental needs and not treatment time. Shulman (1) reported periodontal and non-periodontal treatment needs, and also the treatment necessary to bring the soldier to Class 1.

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[1]Dental Fitness Classifications are based on Department of Defense Directive 6410.1, "Standardization of Dental Classifications", dated 1 March 1991.

Methods

Overview

Dental records of soldiers in Dental Fitness Class 3 were reviewed by dentists and dental noncommissioned officers (NCOs) at the Fort Hood Dental Activity.[2] Estimates of dentist treatment time as well as estimates of type and amount of treatment needed are presented.

Survey Data Collection Form

The survey form is presented in Appendix A. The top portion of the form details patient characteristics as well as identifies the dentist reviewing the record. The bottom portion of the form provides information on the patient's Class 3 classification by tooth, as well as the diagnosis, treatment needed, and total dentist time (by tooth) needed to convert the patient from a Class 3 Dental Fitness Level to a Class 2.

The diagnosis codes used in this study to classify a tooth/teeth as Class 3 were derived directly from Department of Defense Directive 6410.1, "Standardization of Dental Classifications", dated 1 March 1991 (12). The treatment codes used in the survey form were derived from "Dental Statistical Reporting" , Department of the Army Pamphlet 40-16, and the Tri-Service Panel for Dental Wartime Requirements Report (13).

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[2]The dental officers were general dentists and the NCOs were 91Es.

Sampling

Sample Size

An efficient sample size for this survey could not be estimated because no prior knowledge of the variances in treatment times had been reported in the literature. The investigators' research experience and the availability of resources aided the selection of a minimum sample size. Based on the total number of Class 3 records available, it was determined that a minimum of 500 records would be reviewed.

Record Selection

The sampling frame for this study consisted of all 3231 records of soldiers in Class 3 within the DENTAC's six dental clinics (10.3% of all records). The DENTAC Commander selected four clinics that were representative of Fort Hood in terms of the type of soldier (combat arms, combat support, and combat service support) as well as unit assigned (III Corps Headquarters, 2nd Armored Division, and 1st Cavalry Division).

Every fifth Class 3 record was selected from each of the four clinics for a total of 660 records (20.4 percent of all Class 3 records). The sampling process is described in the Letter of Instruction (LOI) distributed to each study participant (Appendix B).

Study Assumptions

In order to capture the individual dentist's perception of treatment time required for commonly performed procedures, no attempt was made to develop a standardized set of estimates of treatment times to use as a starting point for the examining dentists in their estimation process. The only guidance given to the examining dentists was to approach the estimation of treatment times based on working in one dental operatory with one dental assistant (no expanded functions assistant).[3]

Calibration

A calibration session was held on 25 February 1992 at the Fort Hood DENTAC. All participants were given a presentation on the purpose and methods of the study and a copy of the LOI.

Calibration of Non-Commissioned Officers

Ten Class 3 dental records and the data collection form were reviewed and processed by the NCOs. One investigator analyzed and discussed the results of the data entry and dental record transcription.

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[3]This guidance was given because a dentist working with one assistant in one operatory is the modal practice configuration in the U.S. Army Dental Care System.

Calibration of Dentists

Survey NCOs selected 30 Class 3 records that were specially marked for the calibration session. The six dentist-examiners reviewed each of the 30 records and filled out the bottom portion of the data form based on the utilization of available radiographs and entries in the patient's dental record (SF 603). The completed data collection forms were reviewed and questions concerning the study were answered by the investigators. Other than clarification of issues relating to Class 3 classification, diagnosis, and treatment codes, no further guidance was given to the examining dentists.

Record Review

Following the calibration sessions, dental assistants and non-commissioned officers entered patient demographic and background information onto the survey form for all Class 3 records. Completed records were reviewed and entries verified by the project senior NCO.

When the top portion of the survey form was completed, the form along with its corresponding dental record, it was given to one of six dentists for review, for estimation of treatment needs, and to estimate the treatment time required to move the patient from Class 3 to Class 2.[4] The survey forms were completed on 28 February 1992.

[4]Some patients were brought to Class 1 after the initial treatment of the Class 3 tooth/teeth.

Data Entry and Analysis

Completed data collection forms were sent to HCSCIA and edited for errors and inconsistencies. Preliminary edits were performed and inconsistent data forms were referred to the Fort Hood Project NCO for verification or correction. The forms were then keyed to disk by HCSCIA personnel. The data were analyzed using both the mainframe and PC versions of the Statistical Analysis System. ™

Results

Sample Characteristics

Table 1 presents the results of the sampling process. Of the 3,013 Class 3 records available at the time of the study, 660 (21.9 percent) were reviewed by the six examiners. Thirty of the 660 records were used in the examiner calibration session as well as for inter-examiner (reviewed by more than one examiner) and intra-examiner reliability (reviewed by the same examiner twice).

Examiner Characteristics

Of the six general dentists who served as examiners for this study, four were active duty military while two were civilian dentists. The average years of experience for this group was 13.3 years (standard deviation = 7.32) with a median value of 6.25 years and a range of 2.5 to 40 years (the two civilian dentists had 22 and 40 years of experience).

Patient Demographics

Table 2 shows the characteristics of the active duty soldiers whose dental records were used in this study. Of the 660 records reviewed, 385 (58.3%) were from combat arms units,[5] 49 (7.4%) were from combat support units,[6] and 226 (34.2%) were from combat service support units.[7] There were 623 males (94.4%) and 37 (5.6%) were female (Table 3). The age of the sample ranged from 19 to 53 years with a mean and standard deviation of 27.78 and 6.34, respectively, and a median of 26 years (Table 4). Almost 71 percent (467 personnel) were 30 years of age or younger while only 24 (3.6%) were over 40 years of age. The 19 to 24 year old age group comprised 42.1 percent of the combat units, 34.7 percent of the combat support units, and 33.6 percent of the combat service support units (Table 5). For the over 40 years of age group, combat units had 2.4 percent, combat support units had 2.0 percent, and the combat service support units had 6.2 percent.

Approximately 80 percent of the sample was in the pay grade of

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[5]Those units or organizations whose primary mission is destruction of enemy forces and/or installations, such as infantry, air defense artillery, field artillery, armor, aviation, special forces, and combat engineers.

[6]Combat support is operational assistance (including direct combat involvement) furnished combat elements by other designated units such as signal, military police, chemical, and military intelligence.

[7]Combat service support is the assistance provided to operating forces primarily in the fields of administrative services, chaplain services, civil affairs, finance, legal services, health services, supply, management, maintenance, transportation, construction engineers, acquisitions, engineering functions, food services, graves registration, laundry, dry cleaning, bath, property disposal, and other logistic services.

E5 or below with the pay grades of E1 to E9 accounting for nearly 94 percent of the Class 3 records reviewed (Table 6). Of those records surveyed, 621 (94.1%) had bitewing radiographs within the past two years and 513 (77.7%) had a panorex radiograph taken within the past four years (Table 7).

Total Number of Class 3 Teeth

Tables 8 through 12 show the total number of Class 3 teeth involved by unit type, age group, pay grade, and gender, respectively. Table 8 shows that 75 percent of the sample had more than one Class 3 tooth. Table 9 shows that combat, combat support, and combat service support units had 79.4 percent, 69.4 percent, and 71.3 percent, respectively, of their soldiers with more than one Class 3 tooth. The proportion of soldiers with Class 3 teeth did not differ appreciably by age group (Table 10) for the under 40 age groups.

Table 11 shows the frequency of the number of Class 3 teeth per patient according to pay grade. This table shows that the majority of patients with greater than three Class 3 teeth were in the pay grades E9 and below (36.8% for E1 to E4, 37.2% for E5 to E9, 11.5% for O1 to O3, and 7.2% for O4 to O6). Table 12 shows that the frequency of Class 3 teeth did not vary appreciably by gender. [8]

[8]Not significantly different at .05 level (two-tailed).

Most Frequently Involved Teeth

Table 13 shows the most frequently involved Class 3 teeth. Not surprisingly, of the 2,368 Class 3 teeth reviewed in the survey, third molars accounted for the largest proportion (28.4%) with tooth number 32 being the most frequently involved tooth. The five most frequently involved Class 3 teeth by age group are presented in Table 14.

Periodontal Class 3 Conditions

A total of 120 patients (18.2%) had Class 3 periodontal conditions, accounting for 503 sextants of periodontal treatment needs. The total number of sextants involved by age group is presented in Table 15. With the exception of the 36 to 40 age group, the number of sextants of periodontal Class 3 treatment needs varies directly with age.

Primary Diagnosis of Class 3 Conditions

Table 16 shows the frequency of the primary diagnosis for the Class 3 conditions reviewed in this study. The majority of the Class 3 conditions were related to dental caries and/or defective restorations (53.1%). Periodontal conditions (acute/chronic gingivitis, active periodontitis, and periodontal abscess) accounted for 19.6 percent of the conditions and 13.6 percent of the conditions were related to either pericoronitis or unerupted teeth.

Primary diagnosis by unit type is shown in Table 17. Little

difference existed between combat and combat support soldiers for diagnoses relating to dental caries and/or defective restorations (56.7% and 53.9%, respectively) while combat service support soldiers had fewer (46.2%) caries/restorative related diagnoses. In contrast, the combat service support soldiers had a higher proportion of primary diagnoses as periodontal related (32.1% verses 13.5% for combat and 16.8% for combat support). Oral surgery related diagnoses (i.e., pericoronitis and unerupted teeth) accounted for 15.4 percent of the diagnoses for combat units, 14 percent for combat support, and 10 percent for combat service support units.

Table 18 shows how the frequency of primary diagnosis is affected by age. In general, caries/restoration related diagnoses decreased across age groups from 55.3 percent in the 19-24 year group to 21.2 percent for the over 45 year group. Oral surgery related diagnoses followed a similar pattern with 21.8 percent of the diagnoses of the 19-24 year group relating to pericoronitis or unerupted teeth whereas none of the over 45 year group had these diagnoses (only 7% of the 41-45 year group had oral surgery related diagnoses). In contrast, the periodontal related diagnoses increased with age from 10 percent in the 19-24 year group to 57.6 percent for the over 45 year group.

Treatment Needs

Table 19 presents the total treatment needs required to change the dental fitness classification from Class 3 to Class 2. Of the

2169 total procedures required, 47.5 percent were restorative, 27.2 percent were exodontia related, 16.2 percent related to periodontal treatment needs, and 7.6 percent were endodontically related.

Table 20 shows the frequency of treatment needs by age group. Restorative needs dominate the total requirements, especially for all age groups up to the age 41-45 group where the treatment needs appear to be generally distributed across restorative, periodontal, and exodontia needs. As expected, the younger age groups (30 and below) had fewer periodontal treatment needs than older groups. It is interesting to note that both the 19-24 and 41-45 age groups had the highest exodontia needs (35.0% and 32.4%, respectively).

Restorative, periodontal, and exodontia treatment needs did not vary appreciably with gender (Table 21). Table 22 shows that combat service support units had fewer restorative requirements (41.6%) when compared to combat (50.2%) and combat support units (48.3%). However, combat service support units had nearly twice the periodontal treatment needs (24.8%) of the combat (12.3%) and the combat support units (14.0%). Treatment needs for exodontia and endodontics varied only slightly across the three types of units except that combat support units had fewer requirements for posterior endodontic therapy (3.5% compared to combat 7.4% and combat service support 5.3%).

Consultations Required

Consultations were required by 30 percent of the soldiers (Table 23). Of those needing a specialty consultation, 82.3

percent only needed one. The proportion of soldiers requiring consultations differed among age groups (Table 24). For the majority of the younger age groups (up to age 40), less than 35 percent of the soldiers required consultations verses the age groups above 40 years in which nearly 67 percent of the soldiers required specialty consultations. Requirements for consultations did not differ among units (27.8% for combat, 32.6% for combat support, and 33.2% for combat service support; see Table 25).

Consultations Required for Non-Periodontal Reasons

Non-periodontal consultations were needed by 23.9 percent of the soldiers of which 84.2 percent needed only one consultation (Table 26). The proportion of soldiers in age groups 19-24, 25-30, and 31-35 that needed non-periodontal consultations (Table 27) were very similar (23.1%, 26.9%, and 23.8%, respectively). The 36-40 age group had the smallest proportion requiring non-periodontal consultations (13.2%) while the 41-45 age group had the highest proportion (46.7%). There was no appreciable difference in the proportion of soldiers needing non-periodontal consultations between the different units (Table 28).

Consultations Required for Periodontal Reasons

Table 29 shows that only 7.1 percent of all soldiers needed periodontal consultations. Table 30 shows how the proportion of soldiers needing periodontal consultations increased with age, from 0.8 percent for the 19-24 age group to 55.5 percent for the greater

than 45 age group. The proportion of soldiers requiring periodontal consultations varied among units (Table 31) with combat service support having the highest proportion (10.6% verses 4.9% for combat and 8.2% for combat support).

Treatment Time

Treatment time estimates relate solely to dentist time and exclude time required by dental assistants, laboratory technicians, and hygienists.

Non-Periodontal Treatment Time

Non-periodontal treatment time ranged from zero to 12.3 hours with a median of 1.7 hours, a mode of 1.0 hours, a mean of 2.2 hours and a standard deviation of 1.98 hours. Table 32 shows the distribution of non-periodontal treatment time. This table shows that 73.5 percent of all non-periodontal treatment time required three or less hours per soldier.

Table 33 shows non-periodontal treatment time by age group. The proportion of soldiers requiring treatment was highest in the 41-45 age group (100%) and the 19-24 age group (95.7%). It was lowest in the over 45 age group (55.5%). The age group specific non-periodontal treatment time mean ranged from one hour in soldiers over 45 to 2.51 hours for those under 24.

Table 34 shows non-periodontal treatment time by unit. The proportion of soldiers requiring a moderate amount of treatment (0.1 to 3.0 hours) was noticeably different than the proportion

requiring extensive treatment (greater than 3.0 hours) for all unit types. Combat units had the largest proportion of soldiers requiring non-periodontal treatment (94.8%) and had the highest proportion of soldiers requiring extensive treatment (31.8% verses 13.6 and 19.5 for combat support and combat service support, respectively). The unit specific non-periodontal treatment time mean ranged from 1.57 hours in the combat support units to 2.54 hours for combat units.

Table 35 shows non-periodontal treatment time by gender. There was no appreciable difference in the proportion soldiers of either gender requiring non-periodontal treatment (91.3% for males and 94.6% for females). A greater proportion (82.8%) of the females required 3 or fewer hours of treatment than males (72.9%). The mean treatment time for males (2.22 hours) was slightly higher than for females (1.91 hours).

Periodontal Treatment Time

Periodontal treatment time ranged from zero to 12.5 hours with a median of zero hours, a mode of zero hours, a mean of .54 hours and a standard deviation of 1.59 hours. Table 36 shows that 70.8 percent of all periodontal treatment time required three or less hours per soldier.

Table 37 shows periodontal treatment time by age group. The proportion of soldiers requiring treatment was highest in the over 45 age group (66.7%) and lowest in the under 24 age group (9.4%). The age group specific periodontal treatment time mean ranged from

0.14 hours in soldiers under 24 to 4.1 hours for those over 45.

Table 38 shows periodontal treatment time by unit. The proportion of soldiers requiring a moderate amount of treatment (0.1 to 3.0 hours) was noticeably different than the proportion requiring extensive treatment (greater than 3.0 hours) for combat and combat service support units. Combat service support units had the largest proportion of soldiers requiring periodontal treatment (24.8%) while combat support units had the highest proportion of soldiers requiring extensive treatment (55.6% verses 24.6 and 30.4 for combat and combat service support, respectively). The unit specific periodontal treatment time mean ranged from 0.41 hours in the combat units to 0.75 hours for combat support units.

Table 39 shows that there was a slight difference in the proportion soldiers of either gender requiring periodontal treatment (18.4% for males and 13.5% for females). Of those requiring treatment, a greater proportion (73.0%) of the males required 3 or less hours of treatment than females (20.0%). The mean treatment time for males (0.54 hours) was slightly lower than for females (0.64 hours).

Total Treatment Time

Total treatment time is the sum of non-periodontal treatment time and periodontal treatment time. It ranged from 0.2 hours to 12.5 hours with a median of 2.0 hours, a mode of 1.0 hour, a mean of 2.75 hours and a standard deviation of 2.19 hours. Table 40 shows the distribution of total treatment time. The majority

(68.6%) of the sample required 3 or less hours of treatment.

Table 40 shows that the proportion of soldiers requiring a moderate amount of treatment (0.1 to 3.0 hours) was noticeably different than the proportion requiring extensive treatment (greater than 3.0 hours) for all units. There was essentially no difference between combat service support units and combat support units (Table 41) in total treatment time required (means were 2.32 hours for combat support and 2.51 hours for combat service support) and in the proportion of soldiers requiring a moderate amount of treatment (73.4% for combat support and 74.4% for combat service support). Combat units had the highest proportion of soldiers requiring extensive treatment (35.4%) and the highest average total treatment time (mean of 2.95 hours). There was a significant difference in total treatment time means only for the combat and the combat service support units ($p < .01$).

Table 42 shows that there was no difference in the proportion of soldiers in each of the four age groups from 19 to 40 requiring moderate amounts of treatment time (approximately 70%). Age groups 41-45 and over 45 had similar proportions in the moderate treatment time range (46.7% for group 41-45 and 44.4% for the over 45 group). These two older groups had higher proportions of their members requiring extensive treatment time (greater than three hours) than each of the age groups below 40 years of age. The age group specific total treatment time mean ranged from 2.65 hours in soldiers under 24 to 5.1 hours for those over 45.

Table 43 shows total treatment time by gender. A greater

proportion (81.1%) of the females required three or less hours of treatment than males (68.4%). The mean treatment time for males (2.76 hours) was slightly higher than for females (2.55 hours).

Tables 44 through 47 present gender-specific, unit-specific, age-specific, and a summary of periodontal, non-periodontal, and total treatment times, respectively.

Linear Model

Previous univariate comparisons of treatment time by unit, sex, age, and examiner did not adjust for their joint effect. We assume that the distribution of these variables is similar, but covariates may introduce bias. For example, treatment time differences between combat, combat support, and combat service support units could potentially be an artifact of the sex and age composition of the units (Table 3). Multivariate analysis of variance models [9] were tested using the following variables: age group, unit type, gender, dental examiner, a unit-age interaction term, a unit-gender interaction term, and an age-gender interaction term for periodontal, non-periodontal, and total treatment time.

Periodontal Treatment Time Model

The model explained a small amount of the variation in periodontal treatment time ($R^2 = .22$) while the variable age group was the only statistically significant variable ($p < .0001$).

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[9] Statistical Analysis System, PROC GLM™.

Non-Periodontal Treatment Time Model

This model again explained only a small amount of the variation in non-periodontal treatment time (R^2=.17). Age group ($p < .0005$), unit type ($p < .0001$), and dental examiner ($p < .0001$) were all statistically significant. The variable dental examiners accounted for 74 percent of the variation explained by the variables in this model.

Total Treatment Time Model

For total treatment time, the linear model explained a small amount of the variation in treatment time (R^2=.20). Age group ($p < .0012$), unit type ($p < .0031$), dental examiner ($p < .0001$), and the interaction term for unit type-age group ($p < .0549$) were all statistically significant. Variation in dental examiners accounted for 55 percent of the variation explained by the variables in this model.

The three models described above suggest that factors other than the variables collected for this study explain a much larger proportion of the variation in treatment time estimates observed. Despite the small amount of the variation explained by these models, the results compare favorably to results from a previous study involving similar variables (1). In that study involving the treatment needs of soldiers in Dental Fitness Class 2, Shulman et al. used similar variables and explained only 11 percent of the periodontal treatment time, 2.8 percent of the non-periodontal treatment time, and 8.1 percent of the total treatment time.

Although disappointing, these models and their inability to explain a large portion of the observed variation, are consistent with other multivariate analysis of variance models described in the dental literature.

Sensitivity Analysis

While diagnosis and treatment planning involve many widely accepted decision rules, there is still room for substantial variation, both among examiners (intra-examiner) and between examiners (inter-examiner). Estimating treatment time is complex. It involves reviewing the results of the last examination in the dental record, developing a treatment plan, and determining the treatment time. At every stage there is room for variation. The potential for variation increases with the complexity of the treatment plan and the number of decisions that have to be made. In addition, the treatment plan is weighted by time which introduces further variation. It is also assumed that treatment plans that result from reviewing only the dental record and the accompanying radiographs would vary substantially from those involving actual patient examination. All of these factors will result in substantial variation in treatment time between examiners.

For this study, in order to capture the individual dentist's perception of treatment time required for commonly performed procedures, no attempt was made to develop a standardized diagnostic algorithm of estimates of treatment times to use as a

starting point for the examining dentists in their estimation process. Thus, inherent within this phenomenon, substantial variation in treatment times between and among examiners was expected.

Percent Agreement

A common strategy to ensure reproducibility of measurements, especially for research purposes, is to replicate the measurements and evaluate the degree of agreement (14). When one person measures the same item twice and the measurements are compared, an index of variability called intra-examiner reliability is obtained. When two or more persons measure the same item and their measurements are compared, an index of variability called inter-examiner reliability is obtained.

For this study, percent agreement rates for both inter-examiner and intra-examiner reliability were low. In the initial calibration session involving the review of 30 dental records, the mean percent agreement between examiners was 39.7 percent, with a range of 13.3 to 66.7 percent. When the same 30 records were reviewed by the examiners the second time during the main part of the study, the mean agreement between examiners was 45.1 percent, with a range of 26.7 to 66.7 percent.

Intra-examiner reliability was consistent but still very low. The mean was 70 percent agreement with a range of 66.7 to 73.3 percent. A 30 percent proportional difference was selected as an

acceptable level of treatment time variability.[10] It must be noted that percent agreement rates do not take into account the agreement that would have been expected due solely to chance, and thus, these already low agreement rates may in fact overestimate the true agreement rates (15).

Examiner Consistency

As stated before, no attempt was made to develop a standardized diagnostic algorithm of estimates of treatment times to use as a starting point for the examining dentists in their estimation process. Thus, inherent within the diagnostic and treatment planning, substantial variation in treatment times between and among examiners was expected. However, it was assumed that examiners would apply their individual diagnostic criteria to the patient records and would be fairly consistent in their estimated treatment times. This is an issue of reliability of diagnosis and treatment planning.

One issue related to examiner consistency is the occurrence of reversals, especially in longitudinal studies. A reversal, more properly called a negative reversal, is a change of diagnosis in an illogical direction over a period of time long enough for real change to have taken place (16). What has to be remembered about

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[10]A proportional difference of 30 percent in estimated treatment time was arbitrarily chosen as agreement. An example would be as follows: Examiner A estimates treatment time at 2.7 hours and Examiner B estimates 1.9 hours. The proportional difference is (2.7 hrs - 1.9 hrs)/ 2.7 hrs = 29.6 percent and thus would be considered an agreement.

reversals is that if the examiner is consistent, negative reversals will be balanced by positive reversals, which are changes in a logical direction made in error.

Theoretically, the concepts of reversals and examiner consistency can be applied to this study. Because no real change has occurred in the dental problem(s) of the patients, any change in diagnoses and thus estimated treatment time are assumed to be all due to examiner variation. For this study, when paired comparisons (first versus second review) of the 30 sub-group dental records for each examiner were made, there were 41 percent positive reversals and 34 percent negative reversals in total treatment times. This suggests that overall, the examiners were consistent in their estimated treatment times for the records evaluated.

It should also be mentioned that when treatment time estimates were compared for first and second review of each record by examiner, treatment times were significantly correlated between reviews ($r=.6304$, $p<.0001$).[11] When the same comparison was made for individual patient records, there was no significant correlation in treatment times, suggesting the great variation observed between examiners.

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[11]Kendall's coefficient of rank correlation. This statistic measures whether values of paired observations vary together or differently.

Reliability

Reliability[12] was measured using a one way analysis of variance (ANOVA) with the reviewing dentist, the individual patient, and an interaction term of the reviewing dentist and the individual patient serving as the independent variables (17). The proportion of the variance in total treatment time (R^2) as well as the significance of differences in inter-examiner means, individual patients, and the interaction term were determined.

A one way ANOVA showed significant differences between reviewing dentists ($p < .0001$) and that these differences accounted for 14 percent of the proportion of variation in total treatment time.[13] The ANOVA showed significant differences between patients in total treatment time ($p < .0001$) and that these differences accounted for most of the variation in total treatment time (74.5%). The ANOVA showed that an interaction term involving the examiner and the individual patients was also significant ($p < .0252$) and that its contribution to the variation in total treatment time was small (8.7%).

Overall, the model involving the examiner, the individual patients, and the interaction term of examiner and patients, explained a substantial amount of the variation in total treatment time (adjusted $R^2=.71$).

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[12] The kappa statistic was not used since the variable under study (treatment time) was continuous and not categorical.

[13] The coefficient of partial determination (r^2) measures the marginal contribution of one independent variable when all others have already been included in the model.

Conclusions

The amount of estimated dentist treatment time (including consultations) required to bring the sample from Class 3 to Class 2, was 2.75 hours per soldier. Of this, 2.2 hours (80%) was non-periodontal treatment. Combat units had the highest treatment times (2.95 hours per soldier) and the highest proportion of Class 3 soldiers (58.3%). Soldiers under the age of 24 had the highest non-periodontal treatment times (2.51 hours). Of the 660 Class 3 soldier records reviewed, 419 (63.5%) would be placed in Dental Fitness Class 1 after only one treatment session for their Class 3 dental problem.

Non-periodontal and total treatment time estimates were mostly influenced by variability in the dental examiners, while periodontal treatment time estimates were mostly influenced by age. The variability between examiners is not likely an isolated phenomenon of this study, but probably reflects the variability one would encounter within a clinic or a Dental Activity where there is a wide range of clinical experience among dentists.

One use of the results of this study is to enable DENTAC commanders to estimate how many treatment hours would be required, on average, to prepare a large military unit for mobilization.

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APPENDIX A

DATA COLLECTION FORM

DENTAL CLASS 3 MANPOWER SURVEY FORM

RECORD

Provider ID

Radiographs Present (1=YES, 2=NO)

BWX
PANX
PAX

IF NO RADIOGRAPHS ARE PRESENT, LEAVE REMAINDER OF FORM BLANK AND SELECT ANOTHER RECORD.

PATIENT

Last Four

Birth Yr

Pay Grade

UIC W

Gender (1=Male, 2=Female)

Most Recent PANX Yr

BWX (Most Recent) Mo Yr

CLASSIFICATION

Tooth (01-32)	Primary Diagnosis	Treatment Needed	Code After Tx	Consult-ations	DDS Tx (Hours)
					.
					.
					.
					.
					.
					.
					.
					.
					.
					.

DIAGNOSIS CODES

01 - Caries, mild/moderate
02 - Caries, advanced
03 - Defective restoration
04 - Tooth fractures/evulsion
05 - Acute/chronic gingivitis
06 - Active periodontitis
07 - Periodontal Abscess
08 - Pericoronitis
09 - Esthetic emergency
10 - Unerupted teeth
11 - Oral lesions/traumatic or inflammatory
12 - Temporomandibular joint disorder
13 - Post-op/surgery complication
14 - Endodontic condition
15 - Other

TREATMENT CODES

01 - Restorative
02 - Prophylaxis
03 - Occlusal adjustment
04 - Perio scaling
05 - Perio surgery
06 - Oral hygiene
07 - Tooth removal
08 - Tooth removal, complicated
09 - Tooth removal, impaction
10 - Other oral surgery procedure
11 - Endodontic therapy (anterior)
12 - Endodontic therapy (posterior)
13 - Post surgical treatment
14 - Prosthetics
15 - Prescription

APPENDIX B

LETTER OF INSTRUCTION

HSHN-D (5-5) 4 February 1992

MEMORANDUM FOR Dental Officers and Dental NCOs

Subject: Letter of Instruction for Administering Class 3 Manpower Survey Form

1. General Instructions.

a. Fill out forms in #2 pencil

b. NCO should check completed forms for accuracy.

c. One form should be used per record reviewed.

d. One form per 5th record. If 5th record is other than Class 3, go to next class 3 record. Restart count from that record.

2. Fill out each block of form as indicated below:

Provider ID (NCO)	Dentist's first initial of last name initial and last four of social security number.
Radiographs (NCO)	Enter 1 (yes) or 2 (no) for presence or absence of each of the following types of radiographs: Bitewings, Panorex, Periapical.
Patient's Last Four (NCO)	Enter patient's last four of ssn from terminal digit folder.
Birth Year (NCO)	Enter the Year of birth, i.e. 55 for 1955, 72 for 1972.
Pay Grade (NCO)	Enter pay grade, i.e. E5 for SGT, O3 for captain.
UIC (NCO)	Enter Unit Identification Code. W is provided.
Gender (NCO)	Enter a 1 if male, a 2 if female.
PANX YR (NCO)	Enter year of most recent panorex, i.e., 90 for 1990.

BWX (NCO)	Enter date of most recent bitewings, 03 for March, 91 for 1991.
Tooth (DDS)	Enter two digit number for universal tooth numbering, i.e. 01 for upper right 3rd molar, 08 for maxillary right central incisor. **If periodontal treatment is needed for area of a sextant of teeth or a complete sextant rather than an individual tooth, then enter the sextant involved instead of the individual teeth according to the following codes: 91 for teeth 1-6, 92 for 6-11, 93 for 11-16, 94 for 17-22, 95 for 22-27, and 96 for 27-32.**
Primary Diagnosis (DDS)	Enter two digit code from list that best describes why patient is a Class 3 (per tooth).
Treatment Needed (DDS)	Enter two digit code from list for general type of treatment needed to take patient out of Class 3 (per tooth).
Code After Treatment (DDS)	Enter Classification Code per tooth after primary treatment is performed. For example, a tooth requiring endodontic therapy would be classified a 2 if it required further treatment such as a restoration following the endodontic procedure.
Consultations (DDS)	Enter the number of specialty consults required as indicated on SF 603 per tooth.
DDS Tx (Hrs)	Time in quarter hour increments. Best estimate of amount of dentist treatment time needed to include general dentist, estimate of specialty consultation, and specialty dentist treatment time (without X2s).

3. Explanation of Diagnosis Codes:

01 Caries, mild/moderate - no irreversible pulpal involvement.

02 Caries, advanced - probable pulpal involvement from caries.

03 Defective restoration - deteriorated restorations or prostheses that cannot be maintained for 12 months, or result in definitive symptoms.

04 Tooth fractures/evulsions - resulting from trauma, with or without pulpal involvement.

05 Acute/chronic gingivitis - acute/chronic inflammation with or without lose of periodontal attachment and pocket depth less than 5mm.

06 Active periodontitis - acute to severe which may include pocket depth of 5mm or more, tooth mobility, furcation involvement, and severe recession.

07 Periodontal abscess - localized, acute, painful, infection of periodontium.

08 Pericorcnitis - acute, inflammation of tissue surrounding a tooth, usually 3rd molars.

09 Esthetic emergency - teeth requiring immediate prosthodontic treatment for adequate mastication, communication, or acceptable esthetics.

10 Unerupted teeth - unerupted, partially erupted, or malposed teeth with historical, clinical, or radiographic signs or symptoms of pathosis that are recommended for removal.

11 Oral lesions/traumatic or inflammatory - initial or recurring lesions; ANUG; aphthous ulcers; herpetic lesions; traumatic lesions; chemical or thermal burns; lacerations; hematomas or abrasions; oral malignancies.

12 Temporomandibular joint disorders - myofascial pain dysfunction; dislocation, subluxation or other associated conditions.

13 Post-op/surg. complication - post-operative or post-surgical complications including extraction site infection; hemorrhage control; dressing changes; suture procedures; medication application; follow-up care.

14 Endodontic Condition - root canal therapy which represents treatment for the completion of endodontic therapy.

15 Other - any condition not covered by the above list.

TABLES

Table 1

Results of Sampling Process
(N=660)

Clinic	Class 3 Records	Records Sampled	Percent Sample
Perkins	1645	369	22.4
DC #3	985	201	20.4
DC #5	109	26	23.8
Billy Johnson	274	64	23.3
Total	3013	660	

Table 2

Distribution by Unit Type
(N=660)

Unit Type	Frequency	Percent
Combat	385	58.3
Combat Support	49	7.4
Combat Service Support	226	34.2
Total	660	

Table 3

Gender by Unit Type
(N=660)

	Combat		Combat Support		Combat Service Support	
Gender	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	380	98.7	42	85.7	201	88.9
Female	5	1.3	7	14.3	25	11.1
Total	385		49		226	

Table 4

Average Age by Unit Type
(N=660)

	Combat	Combat Support	Combat Service Support
Average Age (years) (standard deviation)	27.4 (5.99)	28.6 (6.13)	28.2 (6.94)
Total	385	49	226

Table 5

Age Groups by Unit Type
(N=660)

	Combat n=385		Combat Support n=49		Combat Service Support n=226	
Age Group	Frequency	Percent	Frequency	Percent	Frequency	Percent
19-24	162	42.1	17	34.7	76	33.6
25-30	113	29.4	13	26.5	86	38.1
31-35	64	16.6	11	22.5	26	11.5
36-40	37	9.6	7	14.3	24	10.6
41-45	6	1.6	1	2.0	8	3.5
45 +	3	0.8	0	0.0	6	2.7

Table 6

Grade by Unit Type
(N=660)

	Combat		Combat Support		Combat Service Support	
Grade	Frequency	Percent	Frequency	Percent	Frequency	Percent
E1-E4	239	62.1	29	59.2	137	60.6
E5-E9	123	31.9	17	34.7	75	33.2
O1-O3	9	2.3	2	4.1	8	3.5
O4-O6	9	2.3	1	2.0	4	1.8
W1-W5	5	1.3	0	0.0	2	0.9

Table 7

Most Recent Radiographs by Unit Type
(N=660)

	Combat		Combat Support		Combat Service Support	
Bitewings	Frequency	Percent	Frequency	Percent	Frequency	Percent
1-2 years	369	95.8	48	97.9	204	90.3
2 + years	16	4.2	1	2.1	22	9.7
Panorex						
1-4 years	294	76.4	40	83.4	179	79.1
4 + years	91	23.7	8	16.6	47	20.9

Table 8

Frequency of Class 3 Teeth
(N=660)

Class 3 Teeth Per Patient		
Number of Class 3 Teeth	Frequency	Percent
1	165	25.0
2	173	26.2
3	86	13.0
4	67	10.2
5	45	6.8
6	42	6.4
7	31	4.7
8	24	3.6
9	9	1.4
10	18	2.7

Table 9

Frequency of Number of Class 3 Teeth Per Patient by Unit Type (N=660)

	Combat (n=385)		Combat Support (n=49)		Combat Service Support (n=226)	
Number of Class 3 Teeth	Frequency	Percent	Frequency	Percent	Frequency	Percent
1	83	21.5	15	30.6	67	27.7
2	90	23.4	15	30.6	68	30.1
3	58	15.1	6	12.2	22	9.7
4	44	11.4	2	4.1	21	9.3
5	30	7.8	3	6.1	12	5.3
6	24	6.2	4	8.2	14	6.2
7	20	5.2	2	4.1	9	
8	15	3.9	0	0.0	9	4.0
9	5	1.3	1	2.0	3	1.3
10	16	4.2	1	2.0	1	0.4

Table 10

Frequency of Number of Class 3 Teeth
Per Patient by Age Group
(N=660)

Number of Class 3 Teeth	19-24 (n=255) (%)	25-30 (n=212) (%)	31-35 (n=101) (%)	36-40 (n=68) (%)	41-45 (n=15) (%)	>45 (n=9) (%)
1	50 (19.6)	59 (27.8)	31 (30.7)	20 (29.4)	1 (6.7)	1 (44.4)
2	77 (30.2)	51 (24.1)	20 (19.8)	22 (32.4)	3 (20)	0
3	30 (11.8)	31 (14.6)	14 (13.9)	8 (11.8)	2 (13.3)	1 (11.1)
4	27 (10.6)	22 (10.4)	12 (11.9)	5 (7.4)	1 (6.7)	0
5	21 (8.2)	10 (4.7)	8 (7.9)	2 (2.9)	3 (20)	1 (11.1)
6	15 (5.9)	13 (6.1)	7 (6.9)	4 (5.9)	1 (6.7)	2 (22.2)
7	12 (4.7)	12 (5.7)	5 (5.0)	1 (1.5)	1 (6.7)	0
8	12 (4.7)	8 (3.8)	2 (2.0)	0	1 (6.7)	1 (11.1)
9	3 (1.2)	3 (1.4)	0	2 (2.9)	1 (6.7)	0
10	8 (3.1)	3 (1.4)	2 (2.0)	4 (5.9)	1 (6.7)	0

Table 11

Frequency of Number of Class 3 Teeth Per Patient by Grade (N=660)

Number of Class 3 Teeth	E1-E4 (n=405) (%)	E5-E9 (n=215) (%)	W1-W5 (n=7) (%)	O1-O3 (n=19) (%)	O4-O6 (n=14) (%)
1	86 (21.2)	60 (27.9)	4 (57.1)	10 (52.6)	5 (35.7)
2	121 (29.9)	43 (20)	0	4 (21.1)	5 (35.7)
3	49 (12.1)	32 (14.9)	0	3 (15.8)	3 (21.4)
4	44 (10.9)	21 (9.8)	2 (28.6)	0	0
5	28 (6.9)	15 (7.0)	1 (14.3)	0	0
6	26 (6.4)	14 (6.5)	0	1 (5.3)	1 (7.2)
7	20 (4.9)	11 (5.1)	0	0	0
8	17 (4.2)	7 (3.3)	0	0	0
9	4 (1.0)	4 (1.9)	0	1 (5.3)	0
10	10 (2.5)	8 (3.7)	0	0	0

Table 12

Frequency of Number of Class 3 Teeth Per Patient by Gender (N=660)

	Male (n=23)		Female (n=37)	
Number of Class 3 Teeth	Frequency	Percent	Frequency	Percent
1	155	24.9	10	27.0
2	162	26.0	11	29.7
3	80	12.8	6	16.2
4	64	10.3	3	8.1
5	42	6.7	3	8.1
6	40	6.4	2	5.4
7	31	5.0	0	
8	23	3.7	1	2.7
9	9	1.4	0	
10	17	2.7	1	2.7

Table 13

Most Frequently Involved Teeth
(n=2368)

Tooth #	Percent	Tooth #	Percent
32	8.5	20	2.2
17	8.1	13	2.1
1	6.7	6	1.6
2	6.3	9	1.6
30	6.2	10	1.5
31	5.6	12	1.5
18	5.5	21	1.4
19	5.1	28	1.4
16	5.1	7	1.3
15	4.8	11	0.9
14	4.7	25	0.6
3	4.0	26	0.5
5	3.4	24	0.4
29	2.9	23	0.4
4	2.8	22	0.3
8	2.4	27	0.2

Table 14

Most Frequently Involved Teeth by Age Group

AGE BAND					
19-24 (n=255)	25-30 (n=212)	31-35 (n=101)	36-40 (n=63)	41-45 (n=15)	>45 (n=9)
Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
32 (12.3)	32 (8.1)	31 (12.5)	5 (9.6)	30 (8.2)	3 (33.3)
17 (11.0)	17 (7.6)	18 (9.8)	20 (7.5)	3 (8.3)	10 (33.3)
1 (9.4)	2 (7.3)	15 (9.4)	2 (6.3)	11 (6.3)	15 (22.2)
30 (7.9)	14 (7.2)	2 (8.6)	8 (5.9)	25 (6.3)	29 (11.1)
16 (6.8)	30 (5.8)	3 (5.9)	28 (5.9)	29 (6.3)	14 (11.1)

Table 15

Percentage of Class 3 Related to Periodontal Conditions by Age Group

Age Group	Sextants per soldier
19-24 (n=255)	.45
25-30 (n=212)	.79
31-35 (n=101)	1.34
36-40 (n=68)	.65
41-45 (n=15)	1.53
45 + (n=9)	2.00

Table 16

Frequency of Primary Diagnosis

Diagnosis	Frequency	Percentage
Caries, mild/moderate	497	17.1
Caries, advanced	685	23.6
Defective restoration	360	12.4
Tooth fractures/evulsion	12	0.4
Acute/chronic gingivitis	212	7.3
Active periodontitis	338	11.7
Periodontal Abscess	18	0.6
Pericoronitis	165	5.7
Esthetic emergency	19	0.7
Unerupted Teeth	230	7.9
Oral lesions/traumatic or inflammatory	3	0.1
Temporomandibular joint disorder	0	0
Post-op/surgery complications	1	0.03
Endodontic condition	163	5.6
Other	196	6.8
Total	2899	

Table 17

Frequency of Primary Diagnosis by Unit Type (N=2899)

	Combat		Combat Support		Combat Service Support	
Diagnosis	Frequency	Percent	Frequency	Percent	Frequency	Percent
Caries, mild/moderate	357	19.5	29	20.3	111	12.0
Caries, advanced	465	25.4	28	19.6	192	20.8
Defective restoration	216	11.8	20	14.0	124	13.4
Tooth fractures/ evulsion	6	0.3	2	1.4	4	0.4
Acute/chronic gingivitis	110	6.0	4	2.8	98	10.6
Active periodontitis	132	7.2	18	12.6	188	20.3
Periodontal Abscess	5	0.3	2	1.4	11	1.2
Pericoronitis	126	6.9	9	6.3	30	3.2
Esthetic emergency	8	0.4	5	3.5	7	0.8
Unerupted teeth	156	8.5	11	7.7	63	0.8
Oral lesions/ traumatic or inflammatory	2	0.1	1	0.7	0	
TMJ disorder	0		0		0	
Post-op/ surgery complication	0		1	0.7	0	
Endodontic condition	116	6.3	6	4.2	41	4.4
Other	134	7.3	7	4.9	55	6.0
Total	1832		143		924	

Table 18

Percent of Primary Diagnosis by Age Group (N=2872)

Diagnosis	19-24	25-30	31-35	36-40	41-45	45 +
Caries, mild/moderate	18.0	20.3	7.9	23.5	5.5	0
Caries, advanced	27.7	21.3	22.0	19.4	12.5	12.1
Defective restoration	9.5	13.0	15.8	20.1	9.7	9.1
Tooth fractures/ evulsion	.17	.22	8	0	0	0
Acute/chronic gingivitis	7.0	10.4	6.9	1.5	1.4	3.0
Active periodontitis	3.1	7.4	29.6	21.3	54.2	54.5
Periodontal Abscess	0	.11	1.7	1.1	1.4	18.2
Pericoronitis	9.8	4.9	1.2	0	0	0
Esthetic emergency	.34	.54	1.2	1.9	0	0
Unerupted teeth	12.1	7.9	2.5	0	6.9	0
Oral lesions/ traumatic or inflammatory	0	.10	.49	0	0	0
TMJ disorder	0	0	0	0	0	0
Post-op/ surgery complication	0	0	0	0	0	0
Endodontic condition	4.5	7.3	5.7	4.8	8.3	3.0
Other	7.7	6.4	3.0	6.3	0	0
Total	1176	918	405	268	72	33

Table 19

Frequency of Treatment Needs

Treatment	Frequency	Percentage
Restorative	1030	47.5
Prophylaxis	100	4.6
Occlusal adjustment	0	0.0
Perio scaling	199	9.2
Perio surgery	49	2.3
Oral hygiene	2	0.1
Tooth removal	251	11.6
Tooth removal, complicated	171	7.9
Tooth removal, impaction	165	7.6
Other oral surgery procedure	1	0.05
Endodontic therapy (anterior)	23	1.1
Endodontic therapy (posterior)	141	6.5
Post surgical treatment	0	0.0
Prosthetics	37	1.7
Prescription	0	
Total	2169	

Table 20

Frequency of Treatment Needs by Age Group

Treatment	19-24	25-30	31-35	36-40	41-45	>45
Restorative	445 (50.6)	343 (50.9)	115 (38.1)	105 (50.00)	17 (23.9)	5 (15.6)
Prophylaxis	46 (5.2)	33 (4.1)	12 (4.0)	7 (3.3)	1 (1.4)	1 (3.1)
Occlusal adjustment	0	0	0	0	0	0
Perio scaling	18 (2.0)	67 (9.9)	68 (22.5)	26 (12.4)	11 (15.5)	9 (28.1)
Perio surgery	0	5 (0.7)	18 (6.0)	5 (2.4)	13 (18.3)	8 (25.2)
Oral hygiene	0	1 (0.1)	0	1 (0.5)	0	0
Tooth removal	100 (11.4)	60 (8.9)	29 (9.6)	34 (16.2)	21 (29.6)	7 (21.9)
Tooth removal, complicated	100 (11.4)	35 (5.2)	28 (9.3)	6 (2.9)	2 (2.8)	0
Tooth removal, impacted	107 (12.2)	50 (7.4)	2 (0.7)	6 (2.9)	0	0
Other oral surgery procedure	0	1 (0.1)	0	0	0	0
Endodontic therapy (anterior)	5 (0.6)	8 (1.2)	7 (2.3)	0	2 (2.8)	1 (3.1)
Endodontic therapy (posterior)	50 (5.7)	60 (8.9)	16 (5.3)	12 (5.7)	3 (4.2)	0
Post surgical treatment	0	0	0	0	0	0
Prosthetics	9 (1.0)	11 (1.6)	7 (2.3)	8 (3.8)	1 (1.4)	1 (3.1)
Prescription	0	0	0	0	0	0
Total	880	674	302	210	71	32

Table 21

Frequency of Treatment Needs by Gender

	Male		Female	
Treatment	Frequency	Percent	Frequency	Percent
Restorative	981	47.3	50	47.2
Prophylaxis	99	4.8	1	0.9
Occlusal adjustment	0		0	
Perio scaling	191	9.2	11	10.4
Perio surgery	45	2.2	4	3.8
Oral hygiene	1	.05	0	
Tooth removal	227	10.9	22	20.8
Tooth removal, complicated	178	8.6	4	3.8
Tooth removal, impacted	157	7.6	8	7.5
Other oral surgery procedure	1	.05	0	
Endodontic therapy (anterior)	22	1.1	1	0.9
Endodontic therapy (posterior)	136	6.6	5	4.7
Post surgical treatment	0		0	
Prosthetics	37	1.8	0	
Prescription	0		0	
Total	2075		106	

Table 22

Frequency of Treatment Needs by Unit Type

	Combat		Combat Support		Combat Service Support	
Treatment	Frequency	Percent	Frequency	Percent	Frequency	Percent
Restorative	688	50.2	69	48.3	274	41.6
Prophylaxis	52	3.8	10	7.0	38	5.8
Occlusal adjustment	0		0		0	
Perio scaling	99	7.2	6	4.2	97	14.7
Perio surgery	18	1.3	3	2.1	28	4.3
Oral hygiene	0		1	0.7	0	
Tooth removal	164	12.0	13	9.1	72	10.9
Tooth removal, complicated	115	8.4	14	9.8	44	6.7
Tooth removal, impacted	106	7.7	15	10.5	44	6.7
Other oral surgery procedure	0		1	0.7	0	
Endodontic therapy (anterior)	15	1.1	0		8	1.2
Endodontic therapy (posterior)	101	7.4	5	3.5	35	5.3
Post surgical treatment	0		0		0	
Prosthetics	13	0.9	6	4.2	18	2.7
Prescription	0		0		0	
Total	1371		143		658	

Table 23

Consultations Required

Number of Consultations	Frequency	Percent
1	163	82.3
2	27	13.6
3	5	2.5
4	1	0.5
5	0	0.0
6	2	1.0
Total	198	

Table 24

Consultations Required by Age Group

	AGE BAND					
Number of Consultations	19-24 (N=255)	25-30 (N=212)	31-35 (N=101)	36-40 (N=68)	41-45 (N=15)	>45 (N=9)
0	33 (35.5)	18 (19.8)	9 (21.4)	6 (27.3)	0	0
1	49 (52.7)	61 (67.0)	29 (69.1)	15 (68.2)	7 (70.0)	2 (33.3)
2	8 (8.6)	9 (9.9)	4 (9.5)	1 (4.6)	3 (30.0)	2 (33.3)
3	2 (2.2)	2 (2.2)	0	0	0	1 (16.7)
4	1 (1.1)	0	0	0	0	0
5	0	0	0	0	0	0
6	0	1 (1.1)	0	0	0	1 (16.7)
Total	93	91	42	22	10	6

Table 25

Consultations Required by Unit Type

Number of Consultations	Combat (N= 385)		Combat Support (N=49)		Combat Service Support (N=226)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
0	42	28.2	4	20.0	20	21.1
1	86	57.7	14	70.0	63	66.3
2	18	12.1	2	10.0	7	7.4
3	2	1.3	0		3	3.2
4	1	0.7	0		0	
5	0		0		0	
6	0		0		2	2.1
Total	149		20		95	

Table 26

Consultations Required for Non-Periodontal Reasons

Number of Consultations	Frequency	Percent
0	502	76.1
1	133	20.2
2	20	3.0
3	4	0.6
4	1	0.1
Total	660	

Table 27

Consultations Required For Non-Periodontal Reasons by Age Group

Number of Consultations	19-24 (N=225)	25-30 (N=212)	31-35 (N=101)	36-40 (N=68)	41-45 (N=15)	>45 (N=9)
1	49 (83.0)	48 (84.2)	22 (91.7)	8 (88.9)	5 (71.4)	1 (50.0)
2	7 (11.9)	8 (14.0)	2 (8.3)	1 (11.1)	2 (28.6)	0
3	2 (3.4)	1 (1.8)	0	0	0	1 (50.0)
4	1 (1.7)	0	0	0	0	0
Total	59	57	24	9	7	2

Table 28

Consultations Required for Non-Periodontal Reasons by Unit Type

	Combat (N=385)		Combat Support (N=49)		Combat Service Support (N=226)	
Number of Consultations	Frequency	Percent	Frequency	Percent	Frequency	Percent
1	78	83.0	11	91.7	44	84.6
2	14	14.9	1	8.3	5	9.6
3	1	1.0	0		3	5.8
4	1	1.0	0		0	
Total	94	24.4	12	24.5	52	23.0

Table 29

Consultations Required for Periodontal Reasons

Number of Consultations	Frequency	Percent
0	613	92.9
1	43	6.5
2	2	0.3
3	0	0.0
4	0	0.0
5	0	0.0
6	2	0.3
Total	658	

Table 30

Consultations Required for Periodontal Reasons by Age Group

Number of Consultations	19-24 (N=255)	25-30 (N=212)	31-35 (N=101)	36-40 (N=68)	41-45 (N=15)	>45 (N=9)
1	2 (100.0)	16 (89.0)	11 (100.0)	7 (100.0)	4 (100.0)	3 (60.0)
2	0	1 (5.5)	0	0	0	1 (20.0)
6	0	1 (5.5)	0	0	0	1 (20.0)
Total	2 (0.8)	18 (8.5)	11 (10.9)	7 (10.3)	4 (26.7)	5 (55.5)

Table 31

Consultations Required for Periodontal Reasons by Unit Type

	Combat (N=385)		Combat Support (N=49)		Combat Service Support (N=226)	
Number of Consultations	Frequency	Percent	Frequency	Percent	Frequency	Percent
1	19	100.0	3	75.0	21	87.5
2	0		1	25.0	1	4.2
6	0		0		2	8.3
Total	19	4.9	4	8.2	24	10.6

Table 32

Non-Periodontal Treatment Time

Hours	Frequency	Percent
0	56	8.5
.1-1.0	185	28.0
1.1-3.0	259	39.2
3.1-6.0	122	18.5
6.1-10.0	33	5.0
>10	5	0.8

Table 33

Non-Periodontal Treatment Time by Age Group

Hours	19-24	25-30	31-35	36-40	41-45	>45
0	11 (4.3)	22 (10.4)	13 (12.9)	6 (8.8)	0	4 (44.4)
.1-1.0	59 (23.1)	56 (26.4)	36 (35.6)	27 (39.7)	4 (26.2)	3 (33.4)
1.1-3.0	109 (42.7)	83 (39.2)	33 (32.7)	25 (36.8)	8 (53.3)	1 (11.1)
3.1-6.0	59 (23.1)	34 (16.0)	16 (15.8)	9 (13.2)	3 (20.0)	1 (11.1)
6.1-10.0	14 (5.5)	15 (7.1)	3 (3.0)	1 (1.5)	0	0
>10	3 (1.2)	2 (0.9)	0	0	0	0
Total	255	212	101	68	15	9

Table 34

Non-Periodontal Treatment Time by Unit

	Combat		Combat Support		Combat Service Support	
Hours	Frequency	Percent	Frequency	Percent	Frequency	Percent
0	20	5.2	5	10.2	31	13.7
.1-1.0	99	25.7	17	34.7	69	30.5
1.1-3.0	150	40.0	21	42.9	88	38.9
3.1-6.0	82	21.3	6	12.2	34	15.0
6.1-10.0	30	7.8	0		3	1.3
>10.0	4	1.0	0		1	0.4
Total	385	94.8	49	89.8	226	86.2

Table 35

Non-Periodontal Treatment Time by Gender

	Male		Female	
Hours	Frequency	Percent	Frequency	Percent
0	54	8.7	2	5.4
.1-1.0	171	27.4	14	37.8
1.1-3.0	244	39.2	15	40.5
3.1-6.0	117	18.8	5	13.5
6.1-10.0	33	5.3	0	
>10.0	4	0.6	1	2.7
Total	623	91.3	37	94.6

Table 36

Periodontal Treatment Time

Hours	Frequency	Percent
0	540	81.8
.1-1.0	22	3.3
1.1-3.0	63	9.5
3.1-6.0	20	3.0
6.1-10.0	14	2.1
>10.0	1	.2
Total	660	

Table 37

Periodontal Treatment Time by Age Group (n=660)

	AGE BAND					
Hours	19-24	25-30	31-35	36-40	41-45	>45
0	231 (90.6)	169 (79.7)	76 (75.3)	52 (76.5)	9 (60.0)	3 (33.3)
.1-1.0	8 (3.1)	9 (4.2)	1 (1.0)	4 (5.9)	0	0
1.1-3.0	16 (6.3)	26 (12.3)	13 (12.9)	2 (2.9)	3 (20.0)	3 (33.3)
3.1-6.0	0	6 (2.8)	5 (4.9)	8 (11.8)	1 (6.7)	0
6.1-10.0	0	2 (0.9)	6 (5.9)	2 (2.9)	2 (13.3)	2 (22.2)
>10.0	0	0	0	0	0	1 (11.1)
Total(n) (%)	255 (9.4)	212 (20.3)	101 (24.8)	68 (23.5)	15 (40.0)	9 (66.7)

Table 38

Periodontal Treatment Time by Unit Type

	Combat		Combat Support		Combat Service Support	
Hours	Frequency	Percent	Frequency	Percent	Frequency	Percent
0	330	85.7	40	81.6	170	75.2
.1-1.0	2	0.5	0		3	1.3
1.1-3.0	40	10.4	4	8.2	36	15.9
3.1-6.0	7	1.8	2	4.1	10	4.4
6.1-10.0	6	1.6	3	6.1	5	2.2
>10.0	0		0		1	0.4
Total	385	13.0	49	18.4	226	24.8

Table 39

Periodontal Treatment Time by Gender

	Male		Female	
Hours	Frequency	Percent	Frequency	Percent
0	508	81.5	32	86.5
.1-1.0	22	3.5	0	
1.1-3.0	62	10.0	1	2.7
3.1-6.0	18	2.9	2	5.4
6.1-10.0	12	1.9	2	5.4
>10.0	1	0.2	0	
Total	623	18.4	37	13.5

Table 40

Total Treatment Time

Hours	Frequency	Percent
0	0	
.1-1.0	158	23.9
1.1-3.0	295	44.7
3.1-6.0	148	22.4
6.1-10.0	50	7.6
>10.0	9	1.4
Total	660	

Table 41

Total Treatment Time by Unit

	Combat		Combat Support		Combat Service Support	
Hours	Frequency	Percent	Frequency	Percent	Frequency	Percent
.1-1.0	89	23.1	16	32.6	53	23.5
1.1-3.0	160	41.5	20	40.8	115	50.9
3.1-6.0	90	23.4	10	20.4	48	21.2
6.1-10.0	40	10.4	3	6.1	7	3.1
>10.0	6	1.6			3	1.3
Total	385		49		226	

Table 42

Total Treatment Time by Age Group

Hours	19-24	25-30	31-35	36-40	41-45	>45
.1-1.0	59 (23.1)	45 (21.2)	28 (27.7)	22 (32.4)	2 (13.3)	2 (22.2)
1.1-3.0	117 (45.9)	103 (48.6)	42 (41.6)	26 (38.2)	5 (33.3)	2 (22.2)
3.1-6.0	63 (24.7)	44 (20.7)	20 (19.8)	15 (22.0)	6 (40.0)	2 (22.2)
6.1-10.0	15 (5.9)	18 (8.5)	10 (9.9)	4 (5.9)	1 (6.7)	2 (22.2)
>10.0	3 (1.2)	2 (0.9)	1 (1.0)	1 (1.5)	1 (6.7)	1 (11.1)
Total(n)	255	212	101	68	15	9

Table 43

Total Treatment Time by Gender

	Male		Female	
Hours	Frequency	Percent	Frequency	Percent
.1-1.0	146	23.4	12	32.4
1.1-3.0	280	44.9	18	40.6
3.1-6.0	142	22.8	6	16.2
6.1-10.0	47	7.5	3	8.1
>10.0	8	1.3	1	2.7
Total	623		37	

Table 44

Gender-Specific Treatment Time Means and Standard Deviation

	Periodontal		Non-Periodontal		Total	
Gender	Mean	Std	Mean	Std	Mean	Std
Male	0.54	1.58	2.22	1.97	2.76	2.17
Female	0.64	1.78	1.91	2.09	2.55	2.50

Table 45

Unit-Specific Treatment Time Means and Standard Deviations (hrs)

Unit	Periodontal		Non-Periodontal		Total	
	Mean	Std	Mean	Std	Mean	Std
Combat	0.41	1.38	2.54	2.15	2.95	2.30
Combat Support	0.75	1.96	1.57	1.24	2.32	1.88
Combat Service Support	0.74	1.80	1.77	1.67	2.51	2.02

Table 46

Age-Specific Treatment Time Means and Standard Deviations

	Periodontal		Non-Periodontal		Total	
Age Group	Mean	Std	Mean	Std	Mean	Std
19-24	0.14	0.48	2.51	2.02	2.65	1.98
25-30	0.45	1.15	2.26	2.18	2.71	2.14
31-35	0.98	2.26	1.83	1.71	2.81	2.38
36-40	0.95	2.08	1.62	1.36	2.57	2.11
41-45	1.92	3.23	2.14	1.47	4.06	2.78
>45	4.10	4.48	1.0	1.71	5.1	4.09

Table 47

Treatment Time Characteristics
Treatment Time (hrs)

	Periodontal	Non-Periodontal	Total
Mean	0.54	2.20	2.75
S.d.	1.59	1.98	2.19
Median	0.0	1.70	2.0
Range	0.0-12.0	0.5-12.3	0.5-12.3

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